International Civil Aviation Organization

FOURTEENTH MEETING OF THE COMMUNICATIONS/NAVIGATION/SURVEILLANCE AND METEOROLOGY SUB-GROUP OF APANPIRG (CNS/MET SG/14)

Jakarta, Indonesia, 19 – 22 July 2010

Agenda Item 4: Aeronautical Mobile Service (AMS)

1) discuss satellite data-link communication continuity issues

DATA-LINK PERFORMANCE MONITORING RESULTS

(Presented by New Zealand)

SUMMARY

This paper reviews some results of data-link performance monitoring within the Auckland Oceanic FIR.

This paper relates to

Strategic Objectives:
A. Safety – Enhance global civil aviation safety
D. Efficiency – Enhance the efficiency of aviation operations

Global plan initiatives:
GPI-17 Data-link applications

1 Introduction

1.1 Data-link communications have been used for CPDLC and ADS-C for many years, and data-link performance requirements have been established. Specific requirements are now published in the Global Operational Data-link Document (GOLD), and reflect those contained in Doc 9869, *Manual on Required Communication Performance*.

1.2 Within the Asia Pacific Region the monitoring of data-link performance is undertaken by the Central Reporting Agencies (CRAs). This paper reviews monitoring results from the Auckland Oceanic FIR.

2 Discussion

2.1 The CRA of the Informal South Pacific ATS Coordinating Group, the ISPACG CRA, has for some time published a collection of data-link monitoring data on its website at http://www.ispacg-cra.com/performance.asp.

2.1.1 These data include:

- CPDLC performance
- Actual communications technical performance (ACTP)
- Actual communications performance (ACP)
- Flight crew response
- ADS-C performance
- System availability

2.2 The de-identified information is presented by aircraft type and by operator, and provides a useful overview of data-link performance in the South Pacific. The data refers to the Auckland Oceanic FIR and is presented on a monthly basis.

2.3 This paper reworks some of these data to reflect performance trends rather than monthly performance.

2.4 Figure 1 below shows the duration of monthly network outages and of the cumulative annual outage. The number in each bar shows the number of outages in each month. The GOLD requires an availability of 99.9% for safety, but adds the more stringent availability of 99.99% for traffic efficiency for ANSPs operating reduced separations in areas of high traffic density. In terms of outages, the safety target is a maximum of 520 minutes total outage in a 12 month period, and the efficiency target is a maximum of 52 minutes total outage and not more than 4 outages of greater than 10 minutes in a 12 month period.

2.5 Figure 2 compares the system availability from December 2008 with the safety target and the efficiency target, based on the running annual total outage.

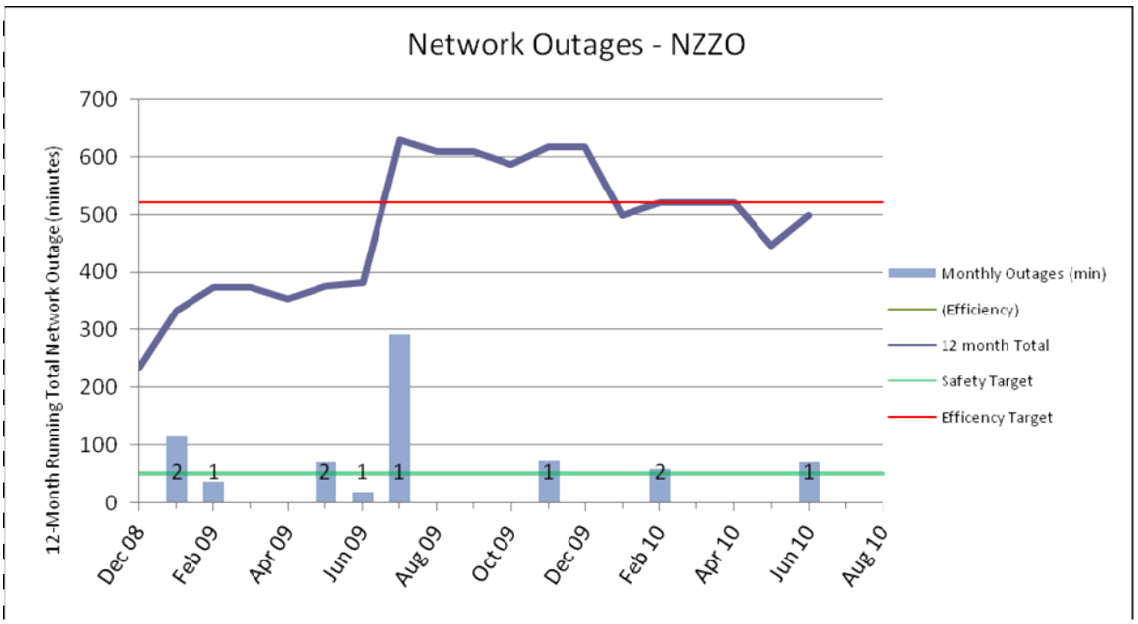

Figure 2 Network Outages

2.6 The duration of the major outage in July 2009 was 292 minutes, and it can be clearly seen that this severely affected the running annual total outage and hence the availability. The availability should improve significantly when the figures to 1 July 2010 are available, when the effect of the 292-minute outage will drop out of the 12-month running data.

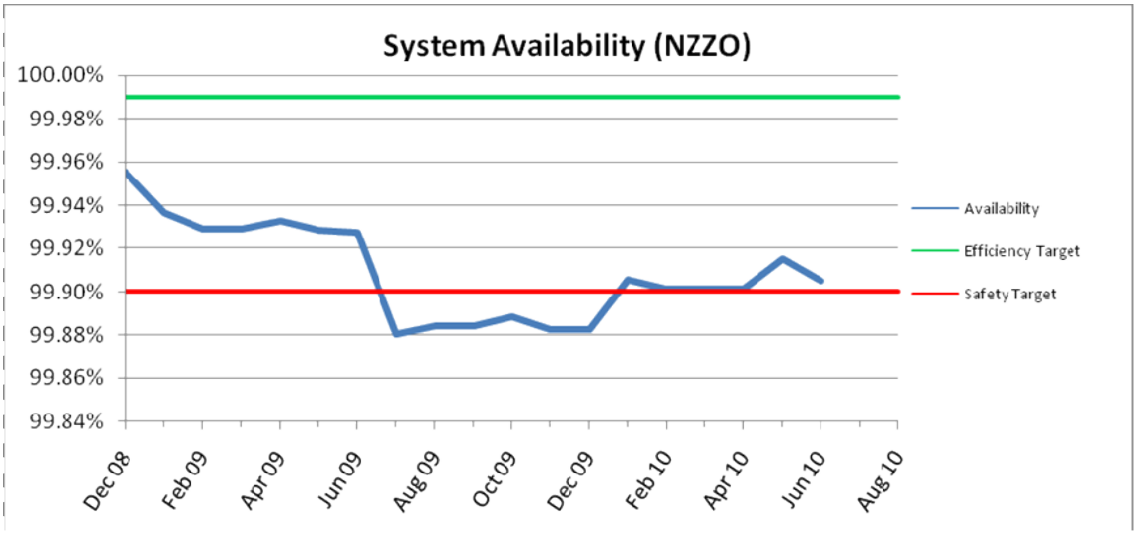

Figure 2 System Availability

2.7 Figure 3 compares the CPDLC ACP with the continuity requirements for RCP 400 and RCP 240. Continuity is the required probability that an operational communication transaction can be completed within the communication transaction time, either expiration time (ET) or nominal time (TT 95%), given that the service was available at the start of the transaction. The 95% figure in each case represents the TT within which 95% of all transactions must be completed; the 99.9% figure is the ET, which is the maximum time for the completion of the operational communication transaction after which the initiator is required to revert to an alternative procedure.

2.8 It should be noted that the ACP includes the pilot response time (60 seconds). Figure 4 shows the same parameters for the actual technical communications performance (ATCP). In practice, achievement of the 60s pilot response time is about 97%.

2.9 Continuity for both ACP and ATCP are well above the target for TT 95%, but neither achieves the ET target.

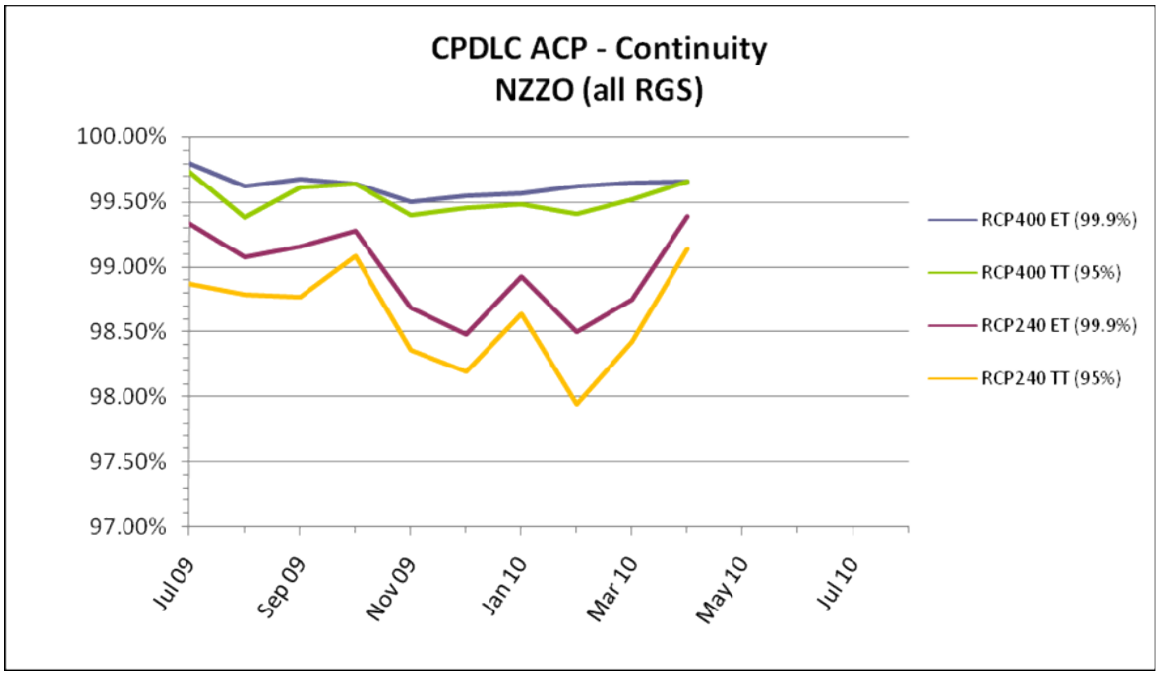

Figure 3 CPDLC Continuity Performance – ACP

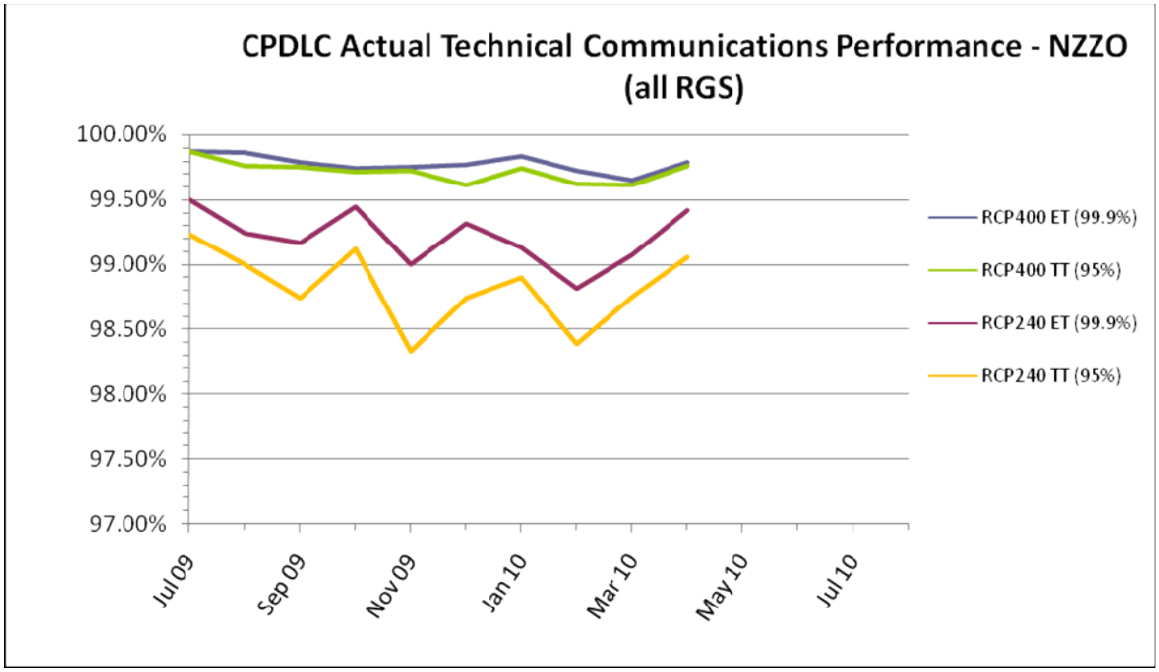

Figure 4 CPDLC Continuity Performance - ATCP

2.10 Figure 5 compares the ADS-C downlink performance with the continuity standards for surveillance Types 400 and 180. Continuity is the required probability that surveillance data can be delivered within the surveillance delivery time parameter, either overdue time (OT) or delivery time 95% (DT), given that the service was available at the start of delivery. The 95% figure represents the delivery time within which 95% of surveillance data is to be delivered, and the 99.9% figure represents the overdue time, which is the maximum time for the successful delivery of surveillance data.

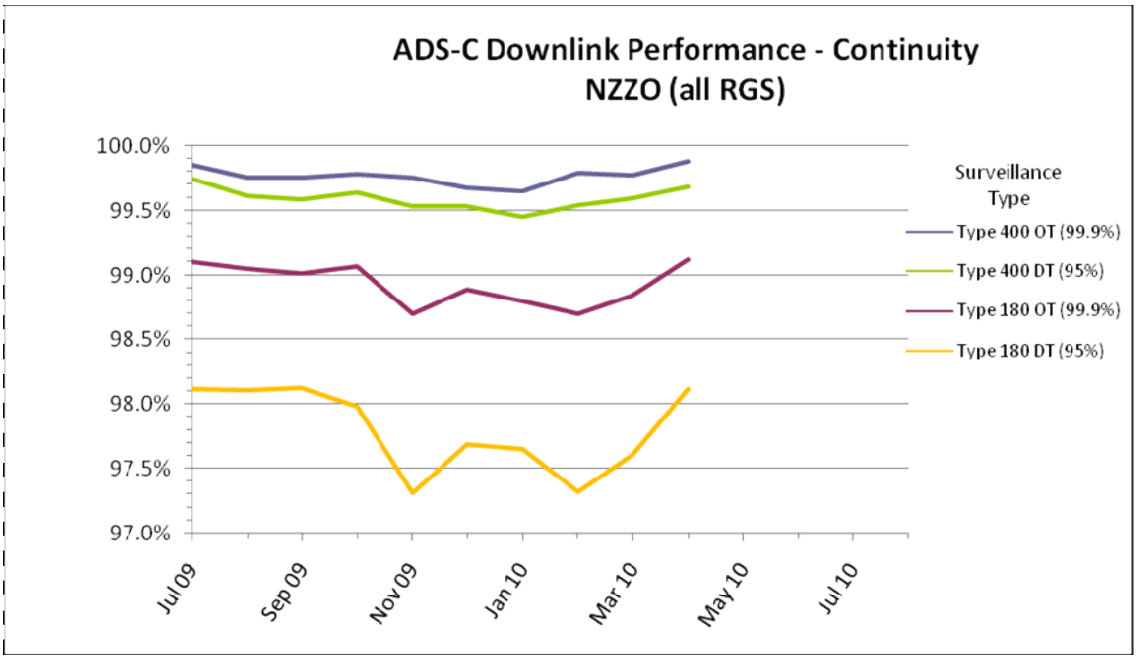

Figure 5 ADS-C Continuity Performance

2.11 As with CPDLC, the continuity easily meets the target for DT 95%, but does not achieve the target for OT.

2.12 The data available do not enable the outages and service delays to be attributed to specific elements of the data-link path (i.e. ANSP, CSP, VHF/HF/satellite, aircraft system).

3 Conclusion

3.1 While the safety targets for network availability are being achieved at present, it is clear that considerable improvement is necessary for the efficiency target to be met. The efficiency target supports operational efficiency and orderly flow of air traffic.

3.2 The nominal times for CPDLC and ADS-C continuity are being achieved, but some improvement is necessary to reach the target for expiration time.

3.3 While this paper relates to the Auckland Oceanic FIR, anecdotal evidence suggests that similar results apply across the region.

4 Recommendation

4.1 The meeting is invited to note the contents of this paper.

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